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ABSTRACT

This activity and record book is designed for unit 3 (ages 15-19) of the Nebraska 4-H Energy Project. Aims, energy attitudes to be developed, and instructions are provided for each activity. Activities include: (1) determining ways to reduce energy waste with hot water heaters; (2) making personal choices about using appliances; (3) conducting a home energy audit; (4) understanding the variety of alternative energy sources available; (5) examining solar energy and creating a model of a solar energy device (sun room, greenhouse, swine barn, or others); (6) determining reactions of people when they are faced with energy shortages; (7) understanding carpooling; (8) planning and carrying out a community wide energy conservation activity; and (9) examining energy-related careers. (JN)

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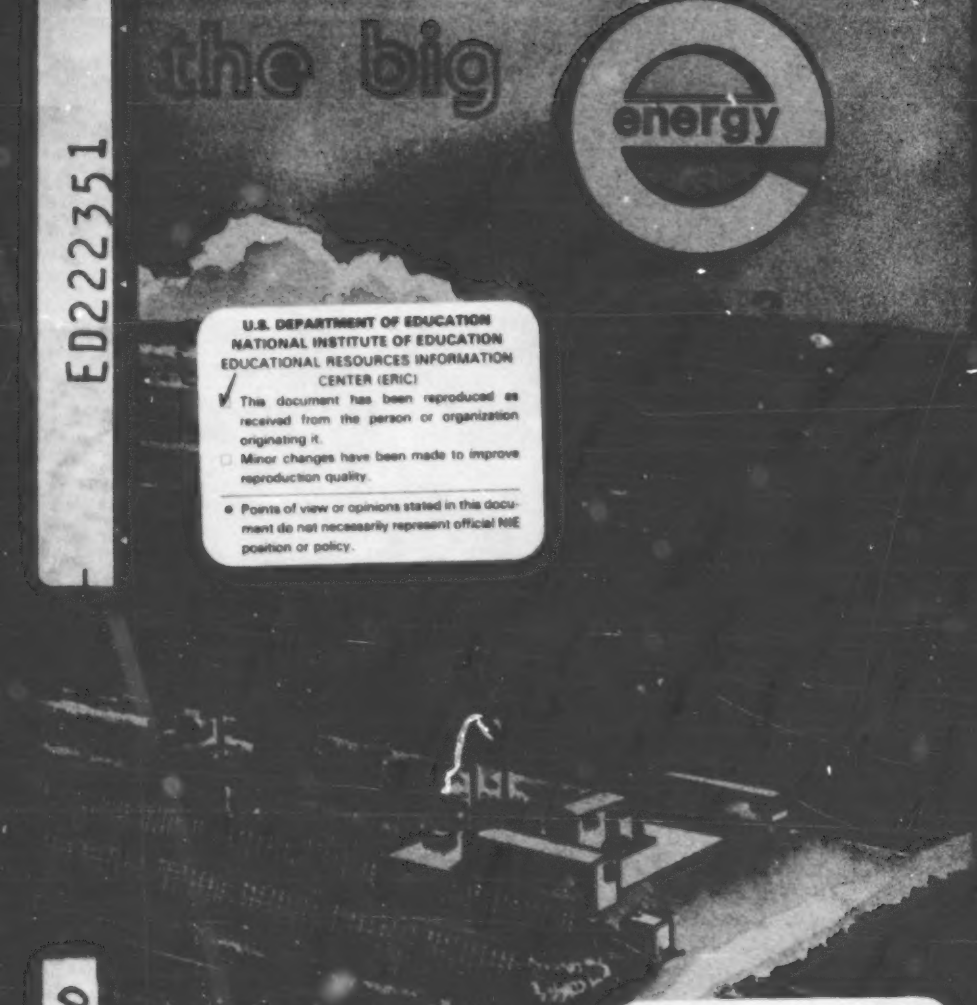
the big energy



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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EXTENSION WORK IN "AGRICULTURE, HOME ECONOMICS AND SUBJECTS RELATING THERETO," THE COOPERATIVE EXTENSION SERVICE, INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES, UNIVERSITY OF NEBRASKA-LINCOLN, COOPERATING WITH THE COUNTIES AND THE U.S. DEPARTMENT OF AGRICULTURE
LEO E. LUCAS, DIRECTOR

Dear 4-H Member:

Participation in the 4-H Energy Project through the Cooperative Extension Service will provide you with ideas, experiences, and skills for your lifetime. From Unit 3 of the Big e Energy Project you should learn to —

1. find thrifty ways to reduce utility bills
2. audit home energy use for reduced fossil fuel consumption
3. explore alternative energy resources, including energy conservation
4. make energy-wise food choices and experiments
5. monitor transportation activities
6. share energy ideas in the community

Match the six goals above with the numbered activities on the Planning Page. Select at least one from each of the six activity groups to meet your learning goals.

Good luck in the Big e Project. America's energy future depends upon your interest and action now.

This material was developed under contract with the Nebraska Energy Office with federal funds disbursed under Public Laws 94-163 and 94-385.
Recycled paper has been used throughout this book.

PAGE	ACTIVITY	PURPOSE	DATE DONE
2	LETTER TO MEMBERS	to understand the Big e project	
4	1. ENERGY IN A FLASH	to conserve hot water	
5	WATCH BEHIND YOUR EERS	to choose and use appliances wisely	
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19	5. FUN AT THE CARPOOL	to develop wise transporation habits	
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25	RESOURCES	a list of helpful energy books and films	

ENERGY IN A FLASH

AIMS: • to reduce energy waste with hot water heaters
• to find other areas in the home where hot water is wasted

ATTITUDES:

Next to home heating and cooling equipment, hot water heaters are often the third greatest residential energy drain. In other countries, heated water is a luxury allowed only during certain hours of the day, or supplied at the faucet source through tiny flash water heaters. An American 40-gallon (152-liter) heater can be used more efficiently if its thermostat is lowered at night and kept at around 140°F (60°C) by day. Families not using electric dishwashers can reduce water heaters to 110°F (43°C). Electric heaters may be covered with insulation batting to reduce heat loss. **CAUTION: Insulation may be unsafe for gas heaters and useless for new energy-efficient models!**

If a leaky faucet lost a drop of hot water each second, in a year this would amount to over 2,200 gallons (10,000 liters). It takes about 600 kWh to heat that water. Many households require only 600 kWh monthly for all electric needs! With a thermometer take the temperature of a cup of hot tap water. _____ °F. _____ °C.

Are you wasting fuel? _____ YES _____ NO

ACTIVITIES: HOW TO MEASURE A DRIP

Find: a metric measuring cup—1/4 liter*
a thermometer a leaky faucet in the home

• Put a measuring cup under a leaky faucet in your home, or adjust your kitchen faucet to produce a steady drip into the cup. Wait for 15 minutes. Multiply the amount of water in your measuring cup by 4 to get the amount of water in an hour:

AMOUNT IN CUP X 4 = _____ WATER MEASURED PER HOUR

Next, multiply that answer by the number of hours in a day:

AMOUNT IN CUP PER HOUR X 24 = _____ AMOUNT PER DAY

How much water (in cups) would that faucet lose in a year if it was not fixed?

DAILY CUPS X 365 DAYS = _____ CUPS PER YEAR*

• Ask your leader about fixing leaky faucets. Give a demonstration about measuring drips and fixing them.

• Despite the Earth's oceans, only 3 percent of its water is fresh and pure enough for human use. What is your family's daily share of this precious supply? (1 gallon = 3.8 liters)

*If you have an 8 fluid ounce measuring cup, how many milliliters would that be? (Hint: one ounce = 30 ml) _____ ml.

DAILY AVERAGE WATER CONSUMPTION PER AMERICAN

for bathing	30-40 gal.	(114-152 l.)
washing clothes	20-30 gal.	(76-114 l.)
allowing faucet leak	35 gal.	(133 l.)
washing dishes	10 gal.	(38 l.)
cooking, house cleaning	8 gal. each	(30 l.)
showering	5 gal. per minute	(19 l./min.)
washing face, flushing toilet	5 gal. each	(19 l.)
drinking water, brushing teeth	1 qt.	(1 l.)

From the chart above add your total daily water use _____ TOTAL PERSONAL WATER CONSUMPTION. Multiply it by the number of people in your household _____ HOUSEHOLD MEMBERS DAILY WATER USE. Multiply this by 365 for TOTAL ANNUAL CONSUMPTION _____ (both gal. and liters).

With world population growing at a rate of 120 people every minute, it is doubling every 33 years. Twenty-five percent of all humans who ever lived on Earth are alive now and needing water every day.

WATCH BEHIND YOUR EERS

AIMS:
- to make wise personal choices about using appliances
- to choose and use large appliances carefully
- to learn about EER's

ATTITUDES:

Sensible purchasing, regular cleaning, and careful use are three major ways to conserve energy with all appliances.

Usually, smaller appliance use fewer watts than large ones. After a furnace, air conditioner, and hot water heater—the refrigerator, freezer and kitchen range probably are the biggest energy users in your home.

You can read the watts of an appliance by looking at the nameplate. For instance, the kitchen range may average 8 to 16 thousand watts, while a microwave oven may have 1,450 watts. This is a total watts used in one hour. To find the amount of electrical energy needed to operate this appliance for a month, multiply wattage of appliances X total hours used per month, then divide by 1000 to get Kilowatts per month.

Example:

A corn popper has 650 watts on the nameplate. 650 watts X 1/2 hour (.5) per month = 325 watt-hours or 3 kilowatt-hours per month. On the other hand an electric clock that is rated 17 watts but runs 365 days a year used more kilowatts per month than the corn popper. Calculate your clock's monthly electrical usage here:

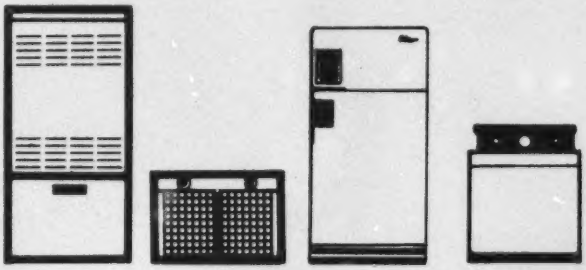
Electric Clock:

ACTIVITY:

When purchasing major appliances such as air conditioners, the Energy Efficiency Ratio (EER) tells you the relative efficiency of an unit. An air conditioner with an EER of 8 will help you conserve electricity. Higher EER ratings of 8 to 15 are more energy efficient. If an appliance does not have an EER rating on the sales tag, you can compute it by dividing the BTU rating by the watts (output divided by input). For instance an air conditioner with a cooling capacity of 12,900 BTU that uses 1500 watts will have an EER of 8. What EER rating does an air conditioner with 10,000 BTU's and using 750 Watts have?**

Figure here:

If the nameplate does not have wattage rating, multiply the voltage X amps = watts.



** An EER of 13.3.

ACTIVITY:

Brightly colored **energyguide appliance labels** help you to —

- compare the energy efficiency of appliance models
- calculate the average annual cost of an appliance (except for climate control units, which have EER labels)
- choose appliances that will cut energy consumption

The major appliances with greatest variations in efficiency require the labels the most — furnaces, air conditioners, refrigerators, freezers, washing machines, water heaters and dishwashers.

Often higher purchase prices of more energy efficient appliances will be offset by the lower energy costs over the lifetime of the units. However, to help you

decide which is a better buy

1. Visit an appliance store. Choose two similar units, one a standard model; the other, with a high energy efficiency rating.
2. Fill in the chart below.

	STANDARD MODEL	ENERGY EFFICIENT ONE	DIFFERENCE
Purchase Price	$_____	$_____	$_____
Cost of Operating			
Yearly cost (copy from appliance label)	$_____	$_____	$_____
Years you expect to keep it	_____	_____	_____
Total operating cost (yearly cost x number of years kept)	$_____	$_____	$_____
Total cost to you (purchase price + line 1, + total operating cost, line 4)	$_____	$_____	$_____

AFTERWARDS:

List some guidelines for helping your air conditioner do an efficient job:

_____

_____

_____

_____

_____

_____

Equipment maintenance keeps appliances in top operating condition (especially heat transmitting surfaces such as motors, fans, coils).

If you use an electric hair dryer, radio, and other small favorite appliances, calculate their kilowatts per month. Compare them with the continuously running clock. Write the results on next page:

ITEM	WATTS	TIME USED PER MONTH	KILOWATTS	COST (about 5¢ per kWh)

List the five appliances in your home with the highest wattage ratings. Write guidelines for improving their energy efficency.

	MAJOR APPLIANCES	WATTAGE	GUIDELINES FOR IMPROVING ENERGY EFFICIENCY
1.			
2.			
3.			
4.			
5.			

Which is your favorite electric appliance? _____

List ten appliances you could live without in order to maintain *your* favorite:

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____

Listed below are some of the ways that your family might conserve electric energy. Check those that you would do:

_____ Reduce use of electricity to minimum needs during high-cost peaking hours (usually 8 a.m.-8 p.m.)

_____ Watch black and white instead of color TV.

_____ Read or do something creative rather than watch TV.

_____ Defrost the refrigerator rather than use a frost-free model.

_____ Live without air conditioning.

_____ Use a small toaster oven instead of range oven.

_____ Bake only once a week but in mass quantities to fill the oven.

_____ Use a slow cook pot for soups, stews, roast, poultry.

_____ Keep freezer full to maintain constant temperature and take load off motor. (Freeze water in plastic milk containers to fill freezer.)

_____ Plan clothes washing for full loads.

_____ Other:

HOME ENERGY INSPECTION

AIM: • to audit (or examine) and analyze your home's energy use of heated and cooled air.

ATTITUDE:

You can learn to determine your home's energy efficiency by looking at the materials in its construction and the equipment needed to heat and cool it. A lot goes into your home to keep you comfortable!

To calculate the cost effectiveness of heating and cooling homes, some states have computer programs that reveal to residents the exact areas where they can save energy and money.[1]

ACTIVITIES:

Getting to know your home is easy. Just write in the answers:

MY HOME .....STATE _____

.....COUNTY _____

1. TYPE: _____ house

_____ apartment _____ condominium

_____ igloo _____ mobile home

_____ caboose _____ other

Number of Floors: _____ 1 story _____ 2 stories _____ 3 stories _____ basement _____ attic _____ crawl space

_____ % underground _____ % above ground

2. TOTAL HEATED AREA OF BUILDING _____ sq. ft. divided by 11 = _____ sq. meters.

(Use a tape measure to determine length and width of each room's floor. Length X width = square feet: convert to square inches by dividing by 144. Divide inches by 2.5 for metric centimeters.)

[1]For instance, a "HOUSE" computer program is available through the Nebraska Cooperative Extension Service offices to help Nebraska homeowners achieve greatest energy savings. The program was developed by the Nebraska Energy Office and the Institute of Agriculture and Natural Resources/University of Nebraska-Lincoln.

ROOM NAME	SQUARE FEET	ROOM NAME	SQUARE FEET

TOTAL SQUARE FOOTAGE _____

multiply by .09 = sq meters _____

3. TOTAL HEATED AND COOLED AREAS Using the chart above, circle the rooms above that are heated in winter (use red or orange pen). Use blue color to circle the rooms that are mechanically cooled in summer. Add up the square footage of each:

AREA HEATED IN WINTER **AREA COOLED IN SUMMER**

____ TOTAL sq. ft. ____ sq. m. **____ TOTAL sq. ft. ____ sq. m.**

EXTRA SPACES:	porches	attic	basement	garage	carport	other—specify
HEATED						
UNHEATED						

Energy Efficiency Ratio of air conditioner: _____ (Enter 0 if unknown.) EER equals BTU's divided by Wattage

4. HEATING SYSTEMS

_____ gas furnace _____ oil furnace _____ heat pump

_____ electric _____ coal furnace _____ solar (passive)

_____ other (specify: _____) _____ solar (active)

5. WHAT FUEL TYPES DOES YOUR HOME USE?

_____ electricity _____ oil #2 _____ hard wood (oak, locust, etc.)

_____ natural gas _____ coal _____ soft wood (pine, fir, etc.)

_____ LP gas _____ solar _____ other, specify _____

Check bills on fuel cost per unit: _____
(e.g., gas by the $/100 cu. ft., electricity = ¢/kWh, wood = $/cord)

Site orientation: What is position of sun–facing wall on the lot?
South _____ Southeast _____ Southwest _____

6. THERMOSTAT SETTINGS

	Daytime Setting		Nighttime Setting	
WINTER	°F.	°C.	°F.	°C.
SUMMER	°F.	°C.	°F.	°C.

	YES	NO
Do you have an automatic thermostat setback control?		
Have you volunteered to manually control the thermostat?		
Do you change the thermostat when the family is away?		
daily?		
on short trips?		

Do you shut off the cooling system when the family is vacationing (see operator's manual)? Note: Heating systems should not be shut off during winter to avoid frozen pipes.

Number of hours that home is occupied during weekdays: _____ HOURS

7. WINDOWS

	Number:	Types:*	EXTERIOR DOORS Number:	Types:**
Attic	_____	_____	_____	_____
Basement	_____	_____	_____	_____
Garage	_____	_____	_____	_____
Ground Floor	_____	_____	_____	_____
2nd Floor	_____	_____	_____	_____
3rd Floor	_____	_____	_____	_____

* types include single glass, double glass, triple glass, and with storms, plastic coverings, styrofoam panels, glass blocks (4" thick)

** types include solid core, hollow core, insulated hollow core, metal plus storms and combination storms

NOTE: include stained glass and other decorative art glass.

Are you planning to cover basement windows if they are single glass?
_____ YES _____ NO _____ Material planning to use (or used)

8. HOT WATER SYSTEM

_____ gas _____ electric

SETTING: daytime _____ nighttime _____ vacation _____

Is the heater insulated? _____ YES _____ NO
Are the pipes insulated? _____ YES _____ NO
Do you have a solar hot water heater? _____ YES _____ NO
Are you considering such a solar device? _____ YES _____ NO

HOME WEATHERPROOFING

AIMS:
- to get into the habit of checking and fixing home drafts every year
- to reduce air leakage per home, thus lowering national fuel waste

Fill spaces behind electrical outlet plates with insulation and gaskets, too!

If you can slip a quarter under a door, it needs weatherstripping!

ATTITUDE:

Seams, where two different exterior building materials meet, as well as cracks around doors, windows, and other movable parts of the home, increase air losses unless properly sealed.

QUALITY OF MATERIALS:	GOOD[1]	FAIR[2]	POOR[3]
PLACES WHERE TWO DIFFERENT BUILDING MATERIALS MEET			
AREAS AROUND DOORS AND WINDOWS			
WINDOW PANELS, FRAMES			
DOOR PANELS, FRAMES			

[1]GOOD:
Weatherstripping that is unbroken, no drafts. Caulk that fills all cracks. Putty that is unbroken and solid.

[2]FAIR:
Weatherstripping that is missing in places or is damaged. Caulk that is missing or cracked. Putty that is missing or is cracked.

[3]POOR:
Weatherstripping that is missing or drafty. Caulk - none. Putty - poor condition.

Any building's draft fixing supplies that are rated below "good" need replacement. If all areas are "good", then recheck again next year.

These efforts plug air leaks and are necessary; however , they have no insulation value. Insulation involves air pockets and vapor barriers in order to be effective.

ALTERNATIVE RESOURCES

AIMS:
- to understand the variety of energy resources available
- to trace resources to a star

ATTITUDES:

You are living in the Energy Age, which follows the Industrial Age and important discoveries of coal, oil, and natural gas as energy resources. In this century, Americans have found these fossil fuels to be the cheapest and most available resources for heating and electrical generation.

More than 60 percent of fuel resources used for residential heating and cooling is wasted because fossil fuels (hydrocarbons) burn thousands of degrees higher than what is needed. These great resources took millions of years for formation and are limited in supply. Therefore, we are seeking alternative energy sources. The easiest alternatives are conservation, or the wise use of energy, and recycling. The sun and its offspring are the next alternatives.

Mankind has always depended upon the sun. The ancients used the sun and designed their buildings, planned their harvests, and developed their religious ceremonies around this star.

Colonial America depended upon wood and waterfalls. Only one billionth of this star's radiation is available for human use, or about one gram calorie* per minute per square centimeter. The sun's heat is hard to harness and transform into useful energy. In a few pages, you will understand why.

You have learned that our energy resources can be traced back to the sun and are all a part of cosmic energy. The fossil fuels were formed from plant and animal material under pressure. Wood, still a major fuel source for the world's people, used the sun's ultraviolet rays for its energy (during photosynthesis** which occurs daily over only 10 percent of the earth's surface). The most powerful and efficient energy force on earth, wind, is also formed by changes in the earth's temperature.

*The amount of heat needed at 1 atmospheric pressure to raise the temperature of 1 gram of water 1 degree Centigrade.

** Sunlight formation of plant food in green leaves. See your 4-H leader about exciting 4-H plant projects!

Underline those energy resources below which can be traced to the sun. Circle those which you think will be important to us in the future:

WOOD
COAL
OIL
NATURAL GAS
SHALE, HEAVY CRUDE OIL
TAR SANDS
NUCLEAR (fusion, fission)
BIOMASS, fuels from grain, forestry, agricultural crops, residues, and animal wastes
WIND
SOLAR (passive, active)
TIDAL
OCEAN THERMAL HEAT
GEOTHERMAL (EARTH'S CORE HEAT)
HYDROGEN FUEL
MICROWAVES
MAGNETIC POWER, LASERS
MAGNETO-HYDRO-DYNAMICS

If you are interested in exploring these resources further, books by Isaac Asimov, John Prenis, Henry Voegeli, and John Tarrant; and pamphlets that are available from your State Energy Office—are exciting reading. What authors would you add? _____

ACTIVITY:

Picture yourself living in 2020 A.D. Discuss and plan with other 4-H'ers a futuristic community with urban and rural characteristics. What will be the needs of the environment and occupants? What fuels will serve the community? What utilities, jobs, transportation and entertainment will be available? This may necessitate library research into energy resources and urban/rural planning. Present your futuristic designs in a talk with illustrations.

SOLAR SEARCH

AIM: • to find immediate alternatives using solar energy

ATTITUDE:

Use the sun rays often as free heat. Follow the sun around your home and decide which rooms can be warmed by it. Close draperies on sunny summer days and sunless winter days. Add reflector panels outdoors to direct more sun into rooms. (NOTE: solar window boxes are often a waste of time and materials since direct sunlight usually does the job cheapest.)

In a year, about one-third of your time, or 3000 hours, is left for recreation. Sports, hobbies, camping, hiking, arts and crafts, and travel may be your interests. How many gallons or liters of gasoline are involved in driving to these activities? How many energy-intensive manufactured materials are involved? Do you use daylight or electric light for them? Could you find as much satisfaction reading a book during daylight hours, riding to places on your bicycle, vacationing close to home, or car-pooling to events?

ACTIVITIES:

Control summer heat and winter winds around windows by designing snug-fitting fabric window coverings or flexible plastic-covered frames that serve as indoor "storms". Ask your County Extension Service for pamphlets on making these. (NOTE: While large north-facing windows are impractical in colder climates, small ones placed near the ceiling let in desirable, shadowless light.)

Do a solar survey of your home:

Indicate site orientation (how home is positioned on the land.)

Percentage of wall area on south side
that is covered with glass:
_____%
Draw what the windows look like and
measure them (write down the sizes)
(including frames) on south side:

Draw trees around your property, indicating closeness to the building. How many evergreen trees are on the north side? _____ south? _____

How many deciduous trees (leaves drop in autumn) are on the south side? _____ north side? _____

Is more than half of the southern area of house shaded for more than four hours a day? In winter? _____ In summer? _____

Some house shapes—enclosed circles, squares, rectangles, non-protruding additions—are practical to heat and cool. Compact and multi-storied houses have this advantage when properly weatherproofed. Multi-family dwellings with common walls, floors, and ceilings are efficient.

When the sun is shining, and the heat is off, take a thermometer and measure the temperature of each room that has sunlight. Then check the temperature of rooms that are on the shaded side. How would you control this sun light?

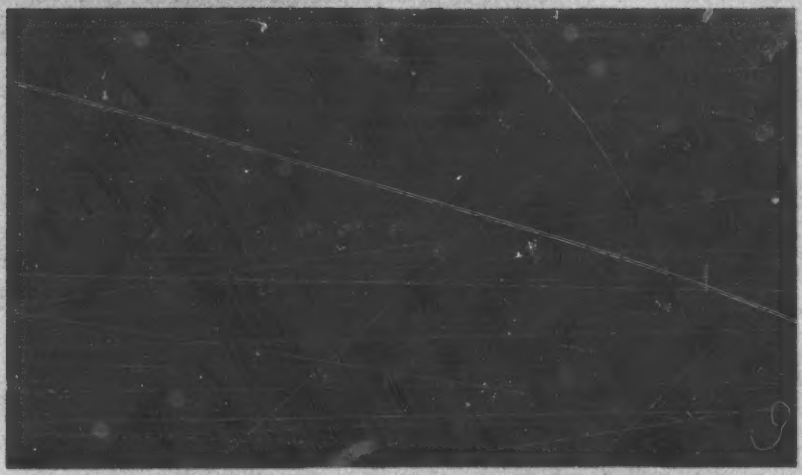
SUNNY ROOMS	TEMPERATURES	SHADED ROOMS	TEMPERATURES

SOLAR SAMPLER

AIM: • to create a model of a solar energy alternative

ATTITUDE:

Buildings can be designed with active or passive solar devices. A passive solar system has only one moving part: the earth moving around the sun. The sun's heat is absorbed by flat collectors or directed by concentrating reflectors, then distributed through natural heat flow and storage (passive system) or by some



THIS SOLAR GREENHOUSE and retrofit roof solar collector was added to a home that is now realizing a 60% reduction in space heating costs.
Engineer: Charles Thomsen **Photo: Dick Dodds**

mechanical device moving heated matter through the building (active system).

Wind devices and power plants also utilize solar energy indirectly. Underground shelters, on the other hand, protect inhabitants from the effects of intense heat, winds, hurricanes, and tornadoes! Some of these partially above-ground shelters have a southern exposure.

ACTIVITY:

SIZE LIMIT: 4 cubic feet (.11 cubic meter)

—Plan, design and build a model of a solar-related device. This can be a handmade 3-D model made from any material such as cardboard or wood.

1) Some solar model ideas are: a sun room, a greenhouse, a swine barn, a solar irrigation pump, a trombe wall, a house showing a passive or active solar heating/cooling system, or something that conserves solar-derived fossil fuels, such as underground shelters. Or design a —

2) Wind device. Like the sun, wind is difficult to capture and store. However, many wind devices have been around for centuries. About 150,000 old rural windmills are still in operation for grinding corn, transportation, irrigation, pumping water, driving machinery, and providing power for farm heating and cooling. Large wind generators for electricity have appeared since the 1940's.

3) By the year 2000, Americans will double their use of electricity. This is the means for converting a fuel source into energy. What kind of fuels will be used for power plants then? With research you may be able to build a power plant model of your own. Or—

4) Perhaps you would prefer to create a model futuristic mega-structure with a community living under one roof!

5) An energy-related process that is scientific and engineering or physics related.

THE COSMOS IS THE LIMIT FOR IDEAS!

P.S. Include estimated energy input-output related to your project.

Enter your 3-D model in your county fair. Evaluate it on the basis of the following criteria.

JUDGING YOUR SOLAR SAMPLER

CONCEPT:	related to energy: product or process _____ efficiently solves energy problem: _____ workable solution _____ acceptable to user _____ economically feasible _____
DESIGN:	shows through planning _____ shows creative ability _____ simplicity _____ within 4 cubic foot (.11 cubic meter) space _____ safety measures taken _____
CONSTRUCTION:	sturdily built _____ no tricks or gadgets _____ reasonably priced materials _____ suitable, practical work _____ construction skills _____
INTERVIEW OBJECTIVES:	project explained clearly _____ data presented in an organized manner _____ 4-H member's own work _____

If a building is designed, ask yourself:

_____ Does it allow for collection, storage and distribution of heated air?

_____ What would the building be like to live or work in?

_____ What would maintenance be like?

_____ Would building management methods have to be adapted to fit this new technology?

e JUDGING

Judging is an important activity for making decisions in daily life. It enables us to compare products or processes. Being able to judge requires some knowledge of the ideal item or method. Then the object or method under inspection is compared with this model or standard. Learning to make decisions as to the quality of our efforts and comparing them with ideals furnishes us with incentives to improve.

For example, in judging wall, floor or ceiling insulation, the material that allows the greatest R-value (heat resistance rating) per allotted area, has ample dead air spaces, and resists moisture, will be preferred insulation. We could also compare its R-value with other insulation materials - batting, loose fill or styrofoam bead board. Sometimes we need to discuss the standards or qualities

with others to determine which is the most ideal.

You are almost finished with your energy unit. If you have tried out the activities, finished them and have kept good records, not only will you be a knowledgeable energy user, but you will be able to evaluate your own efforts in the project. Evaluating your own progress is an important step to learning and provides a motivation for you to continue your interests in energy.

You may wish to discuss with your leader or parent your experiences in this project:

1) What do you feel you have accomplished?
2) What part of the project do you think you did best?
3) What new skills were learned?
4) Where would you like to make addition progress?
5) Have you thought about doing something to conserve energy every day?

EATING YOUR EXPERIMENTS

AIMS: • to see reactions of people when they are faced with shortages

ATTITUDES:

People react differently to shortages. Nationwide shortages demand our patriotism.

What happens when you don't have fossil fuels to store foods, such as refrigeration and canning? Our ancestors, pioneers, native Americans relied on sun heat and low humidity to dry foods - everything from beef jerky to dried fish, herbs and edible seeds, such as corn. The sun and dry air remove moisture from fresh foods, thus deleting the water that otherwise would enable bacteria and fungi to multiply.

ACTIVITIES:

• Make arrangements to be the family cook for one meal when everyone is home. Prepare a favorite family meal using the full amounts for recipe ingredients. But at serving time place less than half the proportions you've cooked onto serving dishes. Observe the reactions as people realize that there is less food than usual. What emotions are involved? Anger? Write some of the comments here:

After you have explained your reasons for testing reactions to rationing, serve the rest of the food. Which would you prefer for your family? Enforced fuel rationing or voluntary fuel conservation? Why?

• Interview someone who has lived through the rationing of World War II. What shortages were there? What does the person remember about food stamp rationing? What foods were rationed? What non-food items were scarce?

Even bubblegum was scarce.

INTERVIEW TECHNIQUES: Put your subject at ease with a few anecdotes or share a short personal story related to the interview topic. Keep the other person in mind first. Be considerate and friendly. Write your questions ahead of time. Edit them. Keep them to the point. Take a small notebook or tape cassette to record answers.

Of all crops on earth, corn uses the sun's energy best. It impounds 25 percent of the ultra-violet radiation from photosynthesis.

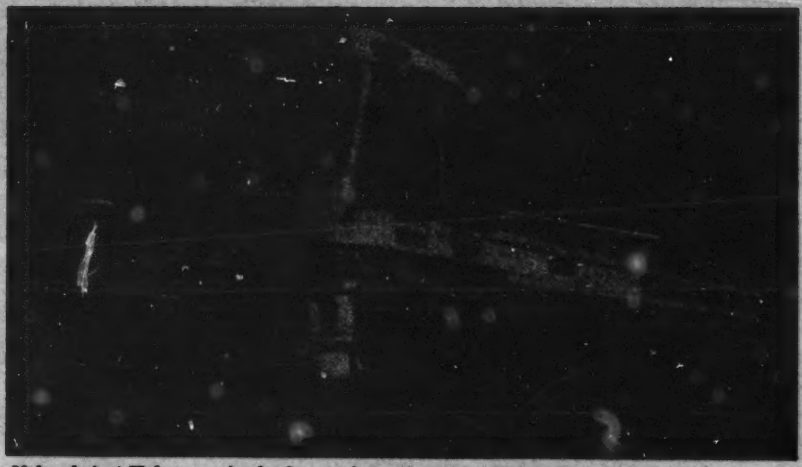
FUN AT THE CARPOOL

AIM:
- to understand the importance of carpools and to use them
- develop consideration for others while carpooling

FUEL FOR THOUGHT: —How much energy is expended to MOVE!

OBJECT MOVING	APPROXIMATE BTUs PER PASSENGER MILE
Bicycle	200 BTUs
Human Feet*	300 BTUs
Bus	1,200 BTUs
Train	1,700 BTUs
Automobile	4,500 BTUs
Airplane	9,700 BTUs

*If all Americans could walk for trips up to 1/3 mile (1/2 km) and bike for trips of two miles (3.25 km) or less, they could save 40,000 gallons of gas per day (152,000 liters) or about 15 percent of the total annual gasoline consumption.



Nebraska's 4-H bus carries leaders and members to 4-H events around the U.S.A., and eliminates the need for at least 7 cars. Photo: Dick Dodds

ATTITUDE:

There are over 100 thousand cars registered in 50 states. These consume over 2/3 of transportation fuels. Over 40 percent of per capita energy goes to autos.

—When is a big vehicle more efficient than a small one?**

—How many dollars could be saved by carpooling? This depends upon your family's determination to conserve gasoline.

—Is a horse more efficient than a car for transportation? Discuss with others.

ACTIVITY:

Check the family auto records for last year's costs of gasoline, oil, repairs, parking and insurance. If possible, include depreciation, or the wear and tear costs of the automobile.

FAMILY AUTO EXPENSES/YEAR _____

Size of car (subcompact, compact, standard, etc.) _____
Gasoline costs per year _____
Approximate miles per gallon (liter per kilometer***) _____
MILES PER GALLON/LITER x MILES PER DAY x DAYS OF TRIP DIVIDED BY NUMBER OF PEOPLE = _____ GALLON/LITER EFFICIENCY INDEX *or*
Figure GAS PER MILE by dividing miles into gallons/liters = _____ GAS PER MILE
This will give you a good base for understanding your car's efficiency.
COST = _____

$$\frac{\text{Miles x 1.6}}{\text{gallons x 3.8}} = \frac{\text{Kilometers}}{\text{per liter}}$$

**ANSWER: When the big one is filled with people and is maintained properly, as in a busload of passengers.

***Calculate average M.P.G by dividing the total miles traveled within 4 fill-ups by the total number of gallons from 4 full fill-ups of gasoline.

Would you be interested in setting up a carpool system for your school? YES _____ NO _____ If yes, ask your local carpool agency for ideas.

AFTERWARDS: Help plan a super pool-a-ride program at your school. Organize committees to make and distribute posters and flyers. Share the facts you've found. In Denver, students have organized a computer-run carpool operation.

ACTIVITY:

POOLING YOUR RESOURCES: If you were in a carpool, what thoughtful action would you take to assure its success? For instance, you could start a card file of drivers and riders:

SCHOOL CARPOOL MATCH UP

YES	NO	PLEASE COMPLETE THE FOLLOWING:
☐	☐	I wish to be included in carpooling.
☐	☐	I have carpooled before.
☐	☐	I would prefer group bicycling or other group transportation (please specify).

NAME _____

ADDRESS _____ ZIP _____

PHONE _____ GRADE IN SCHOOL _____

Time I arrive at school _____ a.m.

Time I leave for home _____ p.m.

Would you prefer to (circle one):

Drive Only	Ride Only	Share Driving	No Preference

• What guidelines for cooperation of drivers and riders would you develop for a carpool? You can use the list below, change or add to it:

CARPOOL GUIDE

1. Share the driving regularly.
2. Be on time as driver or passenger.
3. Don't honk for passengers.
4. Avoid side trips.
5. Establish a "keep car clean" policy.
6. Drive safely.
7. Keep open a communications chain.
8. Check with insurance agent about latest carpooling information.
9. Agree in advance on reimbursement for driving expenses.
10. Remember, cooperation keeps you together.
11. Your ideas

• Transportation planners usually do an auto occupancy survey before road building. It's the number of people carried in all cars divided by the number of cars used. Four-H'ers can easily count car occupants and bicycles near the entrances to their school parking lots. Post a chart showing average auto occupancy and number of bikes at your school. Through posters, talks about carpools, bicycling and walking to school, plan a campaign to increase the number of bicycles and the average occupancy per car. Then do another parking lot and bike rack survey to see how your campaign worked!

Survey Results:

COMMUNITY SHARING

AIM: • to plan and carry out a community-wide activity

ATTITUDE:

Energy conservation is more than saving fossil fuels. It is choosing energy alternatives, including a lifestyle that will be cost effective for you. Enjoy your energy lifestyle by sharing with others your information and ideas. You'll find people's ideas will be mutually beneficial.

ACTIVITIES:

• Plan meetings to conduct a neighborhood energy impact effort. Invite a panel of energy resource experts to speak at a community meeting.

• Homes in your community may be losing energy. Weatherproofing materials may be in need of replacement. Once you have learned to apply insulation to an older home (process of retrofitting) *organize community-wide home energy audits or a retrofitting team. Hang storm windows or apply weatherstripping for the elderly.

• Plan and organize a tree planting project using evergreens as winter windbreaks and deciduous trees for summer shade.**

• Work with several 4-H groups for an all-day solar gala which includes exhibits on energy, a fashion show using clothes for body insulation (winter) and summer ventilation, a solar cookout, sell solar foods for fund raising, present a play. A book, "Reaching Up, Reaching Out: a Guide to Organizing Local Solar Events," is available from SERI, part of the US Department of Energy, 1617 Cole Blvd., Golden, CO 80401, or from the US Gvt. Printing Office in

* Many booklets on how to stop drafts and to insulate are available from your State Energy Office, County Extension Service and libraries.

** See the 4-H "Plant a Tree" project from you Cooperative Extension office.

Washington, D. C. 20402 (Stock Number 061-11100345-2) for $6.00.

- Present a talk to your classmates or to your community groups about changing family lifestyles in energy conservation or other related topics...such as a "Conservation Conversation".
- Part of America's total energy savings system is RECYCLING. Research this and plan a newspaper collection center in your area. Tin and aluminum cans, bottles, even engine oil (controls dust on unpaved roads) can be collected in separate containers. Check with your county Extension Office for information about the money-earning 4-H Aluminum Recycling Program. In 1979, over 88,000 tons (79,200 metric tons) of aluminum were recycled to save 1.1 billion kWh.

ENERGY RELATED CAREERS

AIM: • to relate energy to career goals

ATTITUDE:

Are you concerned about your future career? What job options do you have? Where do you begin to look? These are but a few of the questions many senior highers ask.

ACTIVITIES:

Every job involves energy in some way. Circle 5 of the careers that you are most interested in. Rank them from 1-5 (highest interest being 1). Write 5 associations involved with your choices for career pamphlets. Check a library for further addresses. Tell members how energy is involved in your career choices. What preparation and training is needed for each?

ADVERTISING - American Advertising Federation, Suite 401, 1225 Colorado Av., N.W.; D.C.*, 20036.
AGRONOMY, CROP SCIENCE, SOIL SCIENCE - American Society of Agronomy, 677 S.Segoe Road, Madison, WI, 53711
AERONAUTICS - American Institute of Aeronautics and Astronautics, Student Programs, 1290 Avenue of the Americas, NYC*, 10019
ARCHITECTURE - for "Career Profile" from American Institute of Architects, Director Education Programs; 1735 New York Av., N.W. D.C.* 20006
AUTOMOBILE DESIGN, ENGINEERING & MECHANICS - Society of Automotive Engineers, Inc., Student Relations, 400 Commonwealth Dr., Warrendale, PA 15096
CHEMISTRY - "Careers in Chemistry," American Chemistry Society, 1155 16th St., NW, D.C.* 20036
CONSERVATION - "Career Choices," Environmental Protection Agency, D.C.* 20460
COMPUTER TECHNOLOGY, American Federation of Information Processing Societies, 210 Summit Av., Montvale, NJ 07645
ECONOMIC ACCOUNTING - American Economic Assn, 1313 21st Av., Nashville, TN 37212

* D.C. stands for Washington, D.C.; NYC for New York City, NY.

ENGINEERING - American Consulting Engineers Council, Career Information Specialist, 1155 15th St. N.W., Suite 713, D.C.* 20005; Engineers' Council for Professional Development (for list of accredited schools), 345 E. 47th St., NYC* 10017; American Society of Civil Engineers, (same address as preceeding); "Electrical Engineering as a Career," from Institute for Research, 610 S. Federal St., Chicago, IL 60605; American Institute of Mining, Metallurgical and Petroleum Engineers, 345, E. 47th St., NYC* 10017

FOOD SERVICE - National Institute for Food Service Industry, Suite 856, 120 S. Riverside Plaza, Chicago, IL 60606

FORESTRY - "Wood Industry Career Program," National Forest Products Assn, 1619 Massachusetts AV, N.W., D.C.* 20036

GEOLOGY - "Careers in USDI," U.S. Geological Survey, Information Office, D.C.* 20244

GEOPHYSICS, "Careers," Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, OK 74101

HOME ECONOMICS - American Home Economics Assn., 2010 Massachusetts Av., N.W., D.C.* 20036

LAW - "Careers in Law," American Bar Assn., 1155 E. 60th St., Chicago, IL, 60637

MATHEMATICS - American Mathematical Society, Box 6248, Providence, RI, 02904

PHYSICS (incl. laser, nuclear fission and fusion technology) - American Institute of Physics and American Assn. of Physics Teachers, 335 E. 45th St. NYC*, 10017

REFRIGERATION AND AIR CONDITIONING - "Careers Unlimited," American Society of Heating, Refrigeration and Air Conditioning Engineers, Liaison Education Committee, 345 E. 47th St., NYC* 10017

TRANSPORTATION - American Trucking Assn., Education Services, 1616 P. St., N.W., D.C.* 20036

URBAN PLANNING - American Institute of Planners, 1917 15th St., N.W., D.C.* 2000

OTHER - You may do some library research on new careers in science, medicine, business, service organizations, and the arts.

*D.C. stands for Washington, D.C.; NYC for New York City, NY.

ADDITIONAL ACTIVITIES:

- Your school may have a career counselor who would be willing to speak to your group. This person should be able to relate careers to expanding world needs. Invite another 4-H club to attend.
- Your grades and coursework are an important clue to your career interests. List your courses with the best grades. Do they reflect your interests? YES _____ NO _____ List jobs and community responsibilities you have had. These are initial steps in preparing a job resume. Consult a book or an experienced adult for further help.
- Look through libraries for 5 occupations of interest to you. Compile a list for each, such as:

JOB TITLE _____, JOB DUTIES _____, SALARY RANGE $ _____ TO $ _____
WORKING CONDITIONS (include health hazards) _____, QUALIFICATIONS (education and experience needed) _____, TRAINING NEEDED _____, COST OF TRAINING _____, COST OF PERSONAL EQUIPMENT FOR JOB _____, BEST LOCATIONS FOR JOB _____, LOCAL DEMANDS FOR JOB _____, JOB FUTURE (10 years from now) _____, ADVANCEMENT (how far and fast one can progress) _____, HOW JOB RELATES TO ENERGY _____, (types of energy: fossil fuels - oil, coal, natural gas, and non-fossil fuels - solar, nuclear, geothermal, others) _____.

RESOURCES

For loan of books, slides and films on energy contact your school and public libraries and universities. For pamphlets and audio/visuals write or phone utility companies, the State Energy Office, and your county office of the Cooperative Extension Service.

PEOPLE:
NEBRASKA ENERGY OFFICE (NEO)
State Capitol
P.O. Box 95085
Lincoln, NE 68508
(402) 471-2867
(NEO keeps updated pamphlets and films on energy, most of which are free or on loan to residents.)

COOPERATIVE EXTENSION SERVICE
your county _____
address _____
phone _____

STATE 4-H DEPARTMENT
COOPERATIVE EXTENSION SERVICE
Ag Hall 116
University of Nebraska
Lincoln, NE 68583
(402) 472-2838

NEBRASKA STATE SOLAR ENERGY OFFICE
W191 Nebraska Hall
University of Nebraska
Lincoln, NE 68508

AMERICAN ASSN. FOR THE ADVANCEMENT OF SCIENCE
1515 Massachusetts Av., NW
Washington, D.C. 20005

DOE - TIC (U.S. DEPARTMENT OF ENERGY)
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830
sends out free: "Selected Dept. of Energy Publications."

Dean's Office
ENERGY RESEARCH AND DEVELOPMENT CENTER
College of Engineering and Technology
University of Nebraska
Lincoln, NE 68508

BOOKS:

A GOLDEN THREAD, 2500 YEARS OF SOLAR ARCHITECTURE AND TECHNOLOGY by Ken Butti and John Perlin. Cheshire Books, 514 Bryant St., Palo Alto, CA 94301, 1980
ENERGY SAVING MANUAL by James W. Morrison (most state energy offices have this available for about 50 cents). Harper & Row Publishers, N.Y. 1979.
ENERGY BOOK #1, John Prenis, Editor. Buy from Running Press, 38 S. 19th St., Philadelphia, PA 19103.
ARCHITECTURE AND ENERGY: CONSERVING ENERGY THROUGH RATIONAL DESIGN by Richard G. Stein, Anchor Books, Garden City, N.Y. 1978.
ENERGY ESSAYS by Malcolm Wells, Edmund Scientific Co., 1976.
PROFESSIONAL ENERGY CAREERS, U.S. DOE office of Public Affairs, D.C. 20585.
YOUR FUTURE IN NUCLEAR ENERGY FIELDS, by W.E. Thompson, Jr., Richards Rosen Press, Inc., NYC, 1971.
THE SOLAR HOME BOOK by Bruce Anderson with Michael Riordan, Brick House Pub. Co., Harrisville, NH 03450, 1976.
THE SOLAR GREENHOUSE BOOK, James McCullouch, ed, Rodale Press, Emmaus, PA. 1977.
THE MOTHER EARTH NEWS, HANDBOOK OF HOMEMADE POWER by the news staff of The Mother Earth News, P.O. Box 70, Hendersonville, NC 28739.
Magazines such as Popular Science (see windmills issue, Sept. 1978) and Fortune (see energy issue, Oct. 1979) are available in most libraries.

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